QUARTERLY STATUS REPORT
NAVAL RESERVE SCIENCE AND TECHNOLOGY PROGRAM (PROGRAM 38)

[THIS REPORT HAS BEEN MODIFIED AS FOLLOWS:
Names and contact information has been removed for security reasons.
Please contact the Commanding Officer, NRL 510 for additional information.]

From: Commanding Officer, NRL S&T 510, Houston, TX
To: Director, Naval Reserve Science and Technology Program (Program 38)

Subj: FY03 FIRST QUARTER REPORT

Encl: (1) Project Reports

1. This letter forwards a report summarizing the project activities of NR NRL S&T 510 during the period from October to December 2002. Enclosure (1) contains 7 project reports.

Electronic copy (with enclosures) to:
Program 38 ACOS Operations

SUMMARY SECTION

**From**: NRL S&T 510

**Focus Area**: Space Programs

**Title**: Naval Research Lab-Large Area Debris Collector (LAD-C)

**Impact**:

Members supported the experiment proposed by the Naval Research Lab to be manifested on the Space Transportation System (Shuttle) and installed on the International Space Station (ISS) to collect cosmic particles. Effort saved NRL the cost of design and engineering of the LAD-C.

**Method of Task Accomplishment**:

Supported the meeting of NRL Deputy director of Space Test Program with the DoD Space test program, provided input for the design and integration of the Navy's Large Area Debris Collector mission to ISS. Reviewed the various attachment mechanisms to attach payloads to the ISS. Developed a preliminary design for attaching, deploying and securing the LADC payload (being proposed by NRL) to the space station. Members support the experiment proposed by the Naval Research Lab to be manifested on the Space transportation system and installed on the International Space Station to collect cosmic particles.

**Plans for Future Support**:

Continued support for design, manufacturing, manifest, payload integration, installation and recovery, pending the approval by the Space Experiment Review Board.

**From**: NRL S&T 510

**Focus Area**: NRL

**Title**: Unmanned Underwater Vehicle Task Force Position, Navigation, and Timing

**Impact**:

Assisted the customer PI in determing the Position, Navigation, and Timing requirements and viable approaches for each phase of notional single and multiple UUV Operations.

**Method of Task Accomplishment**:

Collected and highlighted information from 400 pages of documents on low bandwidth signaling and communications. Final products included (1) 10-page paper highlighting the historical difficulty and methods to overcome low bandwidth communication and (2) a separate 3-page paper highlighting underwater diver communication and protocol.

**Plans for future support:**

Complete a power point briefing on findings to be presented to project sponsors at a later date.

**From**: NRL S&T 510

**Focus Area**: NRL

**Title**: TEDServices - WGS84 Transform Module

**Impact**:

TEDServices simplifies communications between multiple data sources/formats and users/applications. It combines heterogeneous data from those sources into a Common Transport Format (CTF), providing a uniform geo-referenced presentation and unified temporal standard. The WGS-84 transform code enables geographic information in other datum (*ie* NAD-72) to be transformed to WGS-84, ensuring that all coordinates handled by TEDServices are based on the same datum.

**Method of Task Accomplishment**:

Member coded and tested two important software modules in Java. One module implements geospatial datum shifts using both the Molodensky 3-parameter formula and multiple regression formulae which are available for various continent-scale datum. In addition to the necessary formulae, this module contains the parameter data for over 250 different local datum, allowing them all to be converted to WGS-84. The second module accepts map coordinates and applies an inverse Lambert Conformal mapping transform to obtain geodetic coordinates. Member has spent a total of 7 days (AT - 5 days plus 4 IDs) on this project.

**Plans for future support:**

Add the formula and data necessary to support the Bursa-Wolf seven parameter datum shift, probably using incremental drill time during 2Q03.

**From**: NRL S&T 510

**Focus Area**: NRL

**Title**: GIDB-2 Webraster Interface & Driver

**Impact:**

A driver to obtain raster images from the web, remove their mapping transform (if any), geo-correct them, and feed them to the Geospatial Information DataBase (GIDB) developed by NRL Stennis code 7440. This driver allows any geographic image on the web to be used in the GIDB software. Examples of images currently in the GIDB catalog include National Weather Service RADAR, satellite weather images, highway traffic maps, earthquake detections, and artic ice predictions. See http://dmap.nrlssc.navy.mil/gidb.html for more information on GIDB.

**Method of Task Accomplishment:**

Building on his work from FY02, member used incremental drill time to code and test a Java module to implement the Mercator mapping transform, fix some bugs from previous releases, and add code to make the driver work with recent changes in the GIDB-2 system. In addition he empirically determined the mapping parameters for a family of 72 QuickScat wind velocity images, for several wave height images, an arctic ice estimate image, and others. During part of his December AT at NRL Stennis, member added & tested a feature to display map legends, coded a module to automatically generate map metadata, and trained NRL personnel in the procedure for determining map transform parameters empirically. Total support: 8 days (AT - 5 days plus 6 IDs).

**Plans for future support:**

Additional images will be added to the catalog using incremental drill time over the next year.

**From:** NRL S&T 510

**Focus Area**: NRL

**Title:** Gray Water Filtration

**Impact:**

Improve the production of future filtration plants for cleaning gray water aboard Naval vessels by researching advanced oxidation technologies.

**Method of Task Accomplishment:**

Member provided 2 days of (Incremental Drill) support in researching advanced oxidation technologies (UV/H2O2, UV/O3 and UV/TiO2) for possible future use in a gray-water treatment system.

**Plans for future support:**

Will continue research into advanced oxidation technologies and provide report for possible research areas by end of 2Q03.

**From:** NRL S&T 510

**Focus Area:** NRL / Business Development

**Title:** NRL Stennis Space Center Project Recruitment

**Impact:**

Historically a small percentage of Program 38 projects supported NRL SSC research. The purpose of the effort was to further develop the relationship between Program 38 and the NRL SSC staff. This effort is a continuation of a visit conducted in January 2002. The visit further reinforced the value of Program 38 and ensured the lines of communication remained open. Additional project opportunities will result from this visit.

**Method of Task Accomplishment**:

A Program 38 visit to NRL Stennis was conducted on December 5/6 2002. There were two objectives for this visit. The first objective was to conduct a top level Program 38 brief to division heads, military deputies and branch heads. The purpose of this briefing was to reinforce the value of Program 38 support to the executive management team. The second objective was to conduct individual meetings with each branch head and with project Principal Investigators (PI) in order to identify potential new projects. Accomplishments:

- The team met with the top management of Codes 7180, 7300 and 7400 and several PIs from each branch.
- Reinforced the value of Program 38 to NRL Stennis research projects.
- Demonstrated the Edison website to the management team and PIs.
- Identified several potential new projects. LCDR [...] is working with the team to ensure the identified projects are documented in the Edison website.

**Plans for Future Support**:

CO's of NRL S&T 510 and 108 will continue to work with the NRL SSC management team to facilitate identification and support for NRL SSC research projects.

**From:** NRL S&T 510

**Focus Area:** IFO

**Title:** Data Mining Project on Biomaterials

**Impact:**

Information provided by the project will facilitate IFO-London in contacting experts in the field of Biomaterials.

**Method of Task Accomplishment:**

Performed data mining on biomaterials using keywords provided by POC. Provided POC with results from initial broad data mining. POC reviewed results with IFO London biomaterials scientists and asked for more in-depth data mining on three specific institutions leading biomaterials research in Western Europe. Performed data mining and provided results for data mining on the three institutions.

**Plans for future support:**

Customer has requested continued data mining research on Biomaterials and other related topic areas.